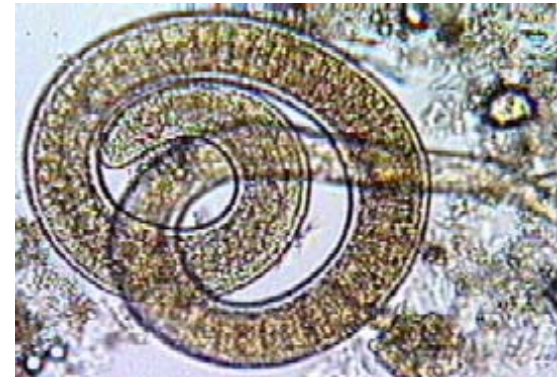


Solutions to a 'Tricky' surveillance problem

N. Cogger, D. Prattely, M. Maumoon, C. Sauter-Louis, R.
Cannon and R. Morris



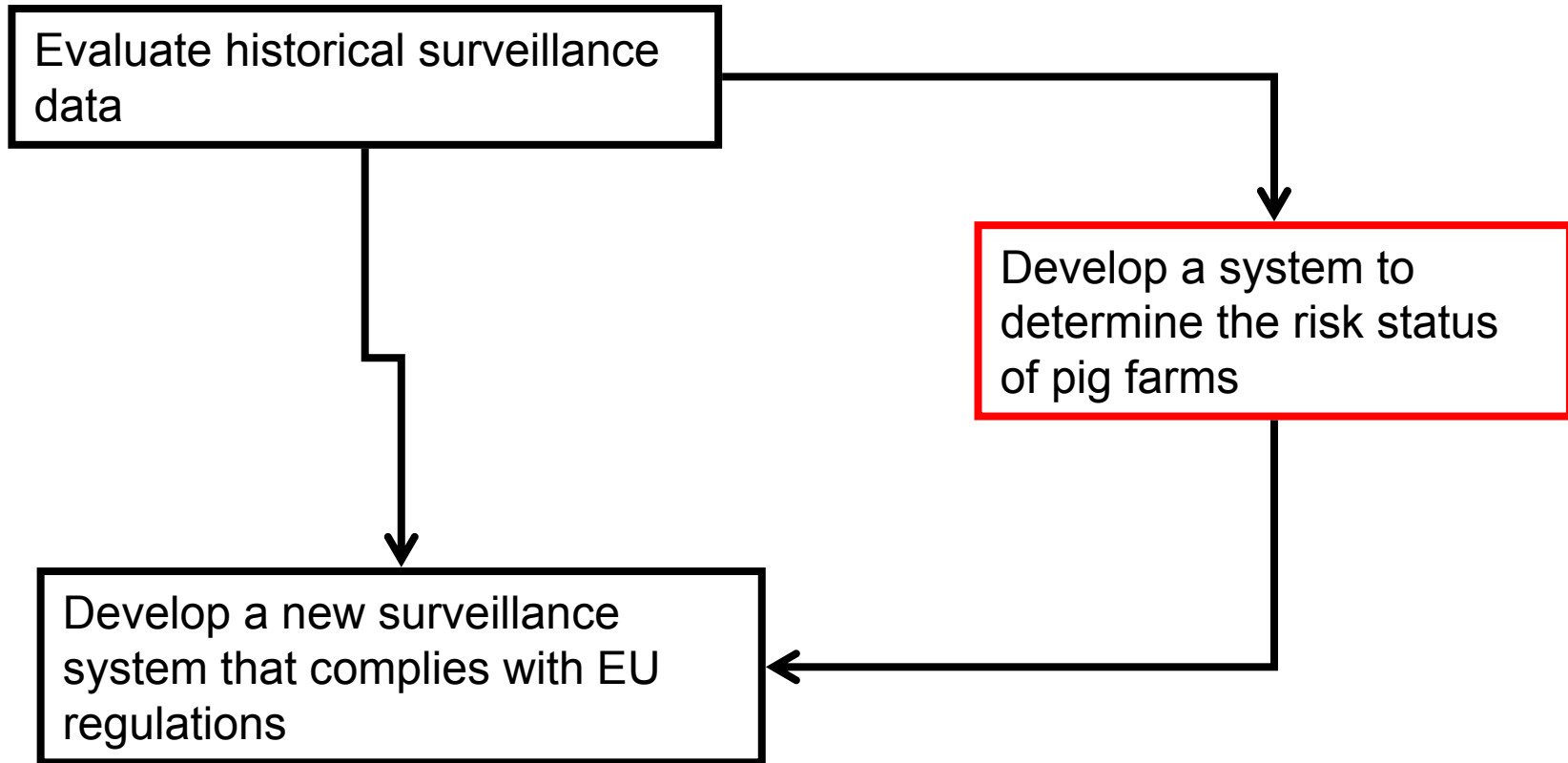
Background

- *Trichinella spiralis* is a parasite that causes the disease trichinellosis in humans
- Wide range of mammalian hosts including:
 - Pigs, humans, cats, rodents and foxes
- Historically, trichinellosis in man has been associated with the consumption of undercooked pork products
- More recently in Europe human cases of trichinellosis have been associated with horse meat.
- In China human trichinellosis is associated with mutton.

Background

- The European Commission has released a resolution that:
 - It will NOT recognise regions of disease freedom;
 - has imposed requirements that all Member States of the European Union conduct surveillance testing for *Trichinella*.
 - A country may have reduced surveillance requirements if they can demonstrate a negligible risk of trichinellosis in the human population.

Project aims



Methodology for developing a farm risk status

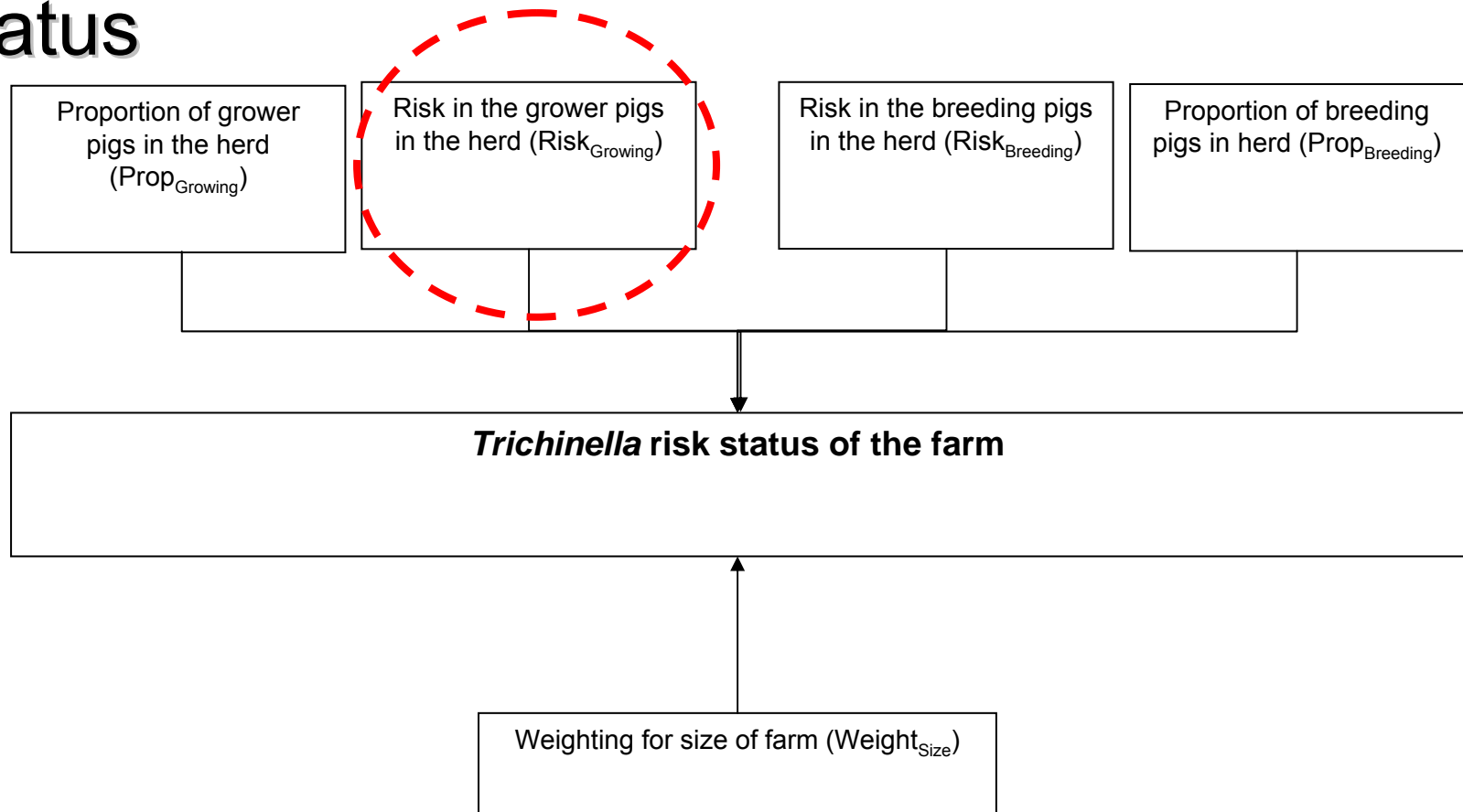
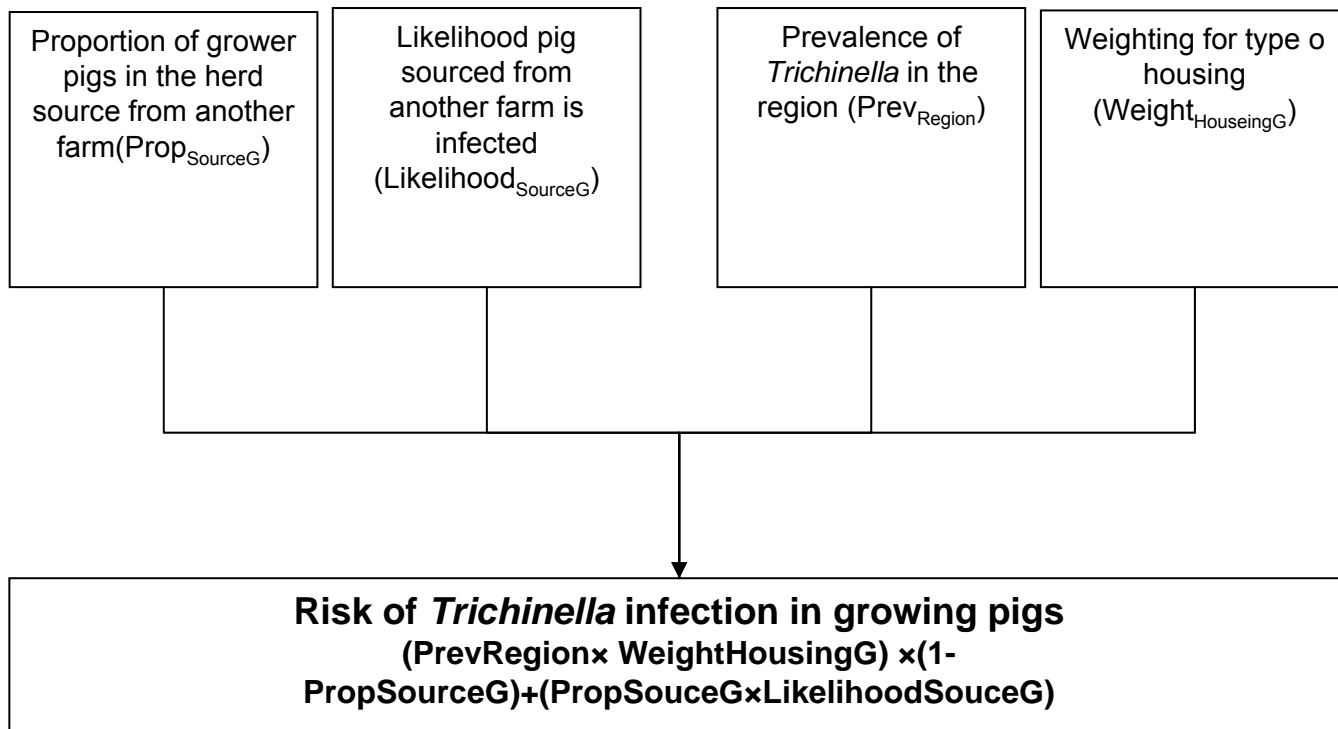


Figure 1: Conceptual overview of the process used to estimate the risk profile for an individual farm.

Risk status in growing pigs



Conceptual overview of the process used to estimate the risk of *Trichinella* infection in growing pigs.

Risk status in growing pigs

- Prevalence of *Trichinella* in pigs ($Prev_{Region}$)
 - $Prev_{Region}$ was defined as the upper 95% Confidence Interval (CI) for the prevalence of *Trichinella* in the geographical area where the farm was located.
 - Estimating the upper 95% CI for the prevalence was complicated because *Trichinella* has not been detected in Great Britain for 30+ years
 - To overcome this problem we estimated the upper 95% CI using a derivation of the BSurvE method (i.e. surveillance method used for BSE) .

Risk status in growing pigs

- Prevalence of Trichinella in pigs ($Prev_{\text{Region}}$)
 - GB was divided into 150 areas containing equal numbers of pigs (i.e equi-pig areas)
 - Upper 95% CI in each of these areas was estimated using surveillance data captured in that geographical area.
 - Negative test results from some species provide greater support for negligible risk than negative test results from other species

Risk status in growing pigs

- Weighting for type of housing ($Weight_{HousingG}$)
- $Weight_{HousingG}$ was included because studies have shown that the level of infection in pigs housed outdoors is higher than in those raised indoors.
- Based on the epidemiological studies the value for $Weight_{HousingG}$ was:
 - 1 if growing pigs were accommodated in housing with NO access to the outdoors or wildlife carcasses; and
 - 5 if pigs were accommodated in housing with access to the outdoors and/or wildlife carcasses.

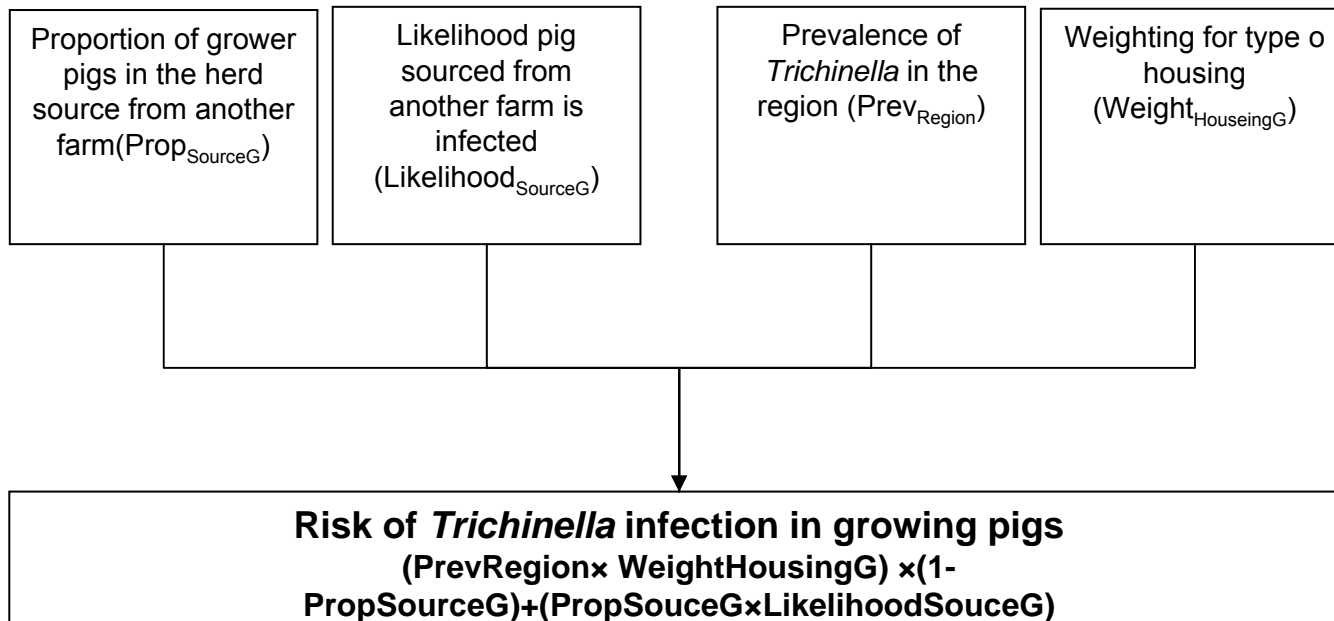
Risk status in growing pigs

- Proportion of growing pigs sourced from another farm
 - Capturing data on the proportion of growing pigs sourced from another farm would be detailed record keeping.
 - Hence, we estimate the value based on assumptions about different types of farms.

Risk status in growing pigs

- Likelihood that growing pigs sourced from another farm are infected with Trichinella (Likelihood_{SourceG})
 - To accurately determine Likelihood_{SourceG} we require information:
 - about the location where the pigs were sourced;
 - the type of housing at the other farm; and
 - the time the pig spent at that another farm prior to arrival at the farm of interest.
 - Problem
 - This information is not routinely collected
 - there is insufficient data available in the literature to use the data meaningfully
 - Solution- assume the worse case

Risk status in growing pigs



Conceptual overview of the process used to estimate the risk of *Trichinella* infection in growing pigs.

Developing a farm risk status

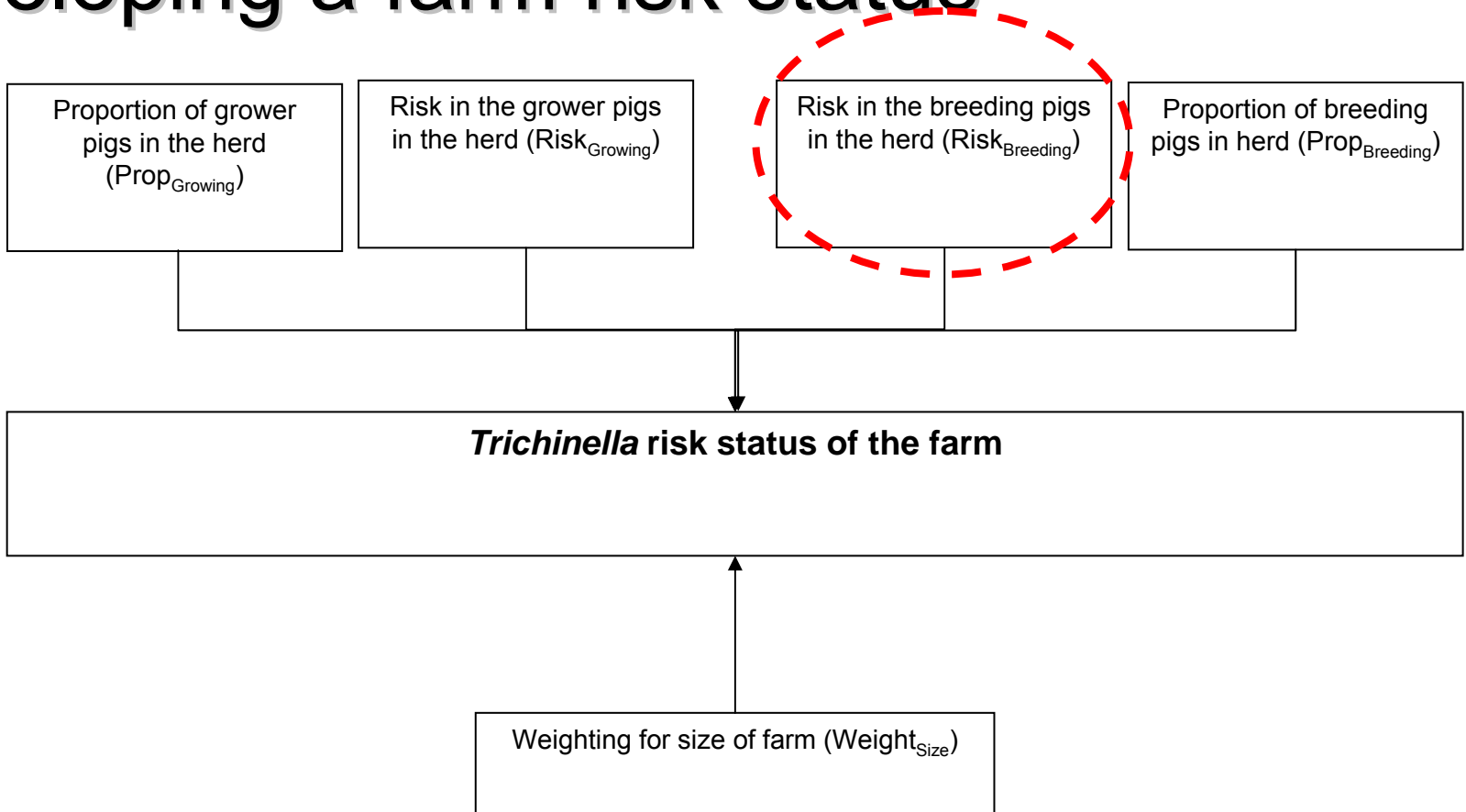


Figure 1: Conceptual overview of the process used to estimate the risk profile for an individual farm.

Risk status of breeding pigs

- Method identical to that used to estimate the risk in status of growing pigs
- EXCEPT a weighting variable for age of the pig was included.
- This variable was included to accounted for the increased risk of infection in older animals.
- Based on a number of observational studies the value for this variable was 2.

Developing a farm risk status

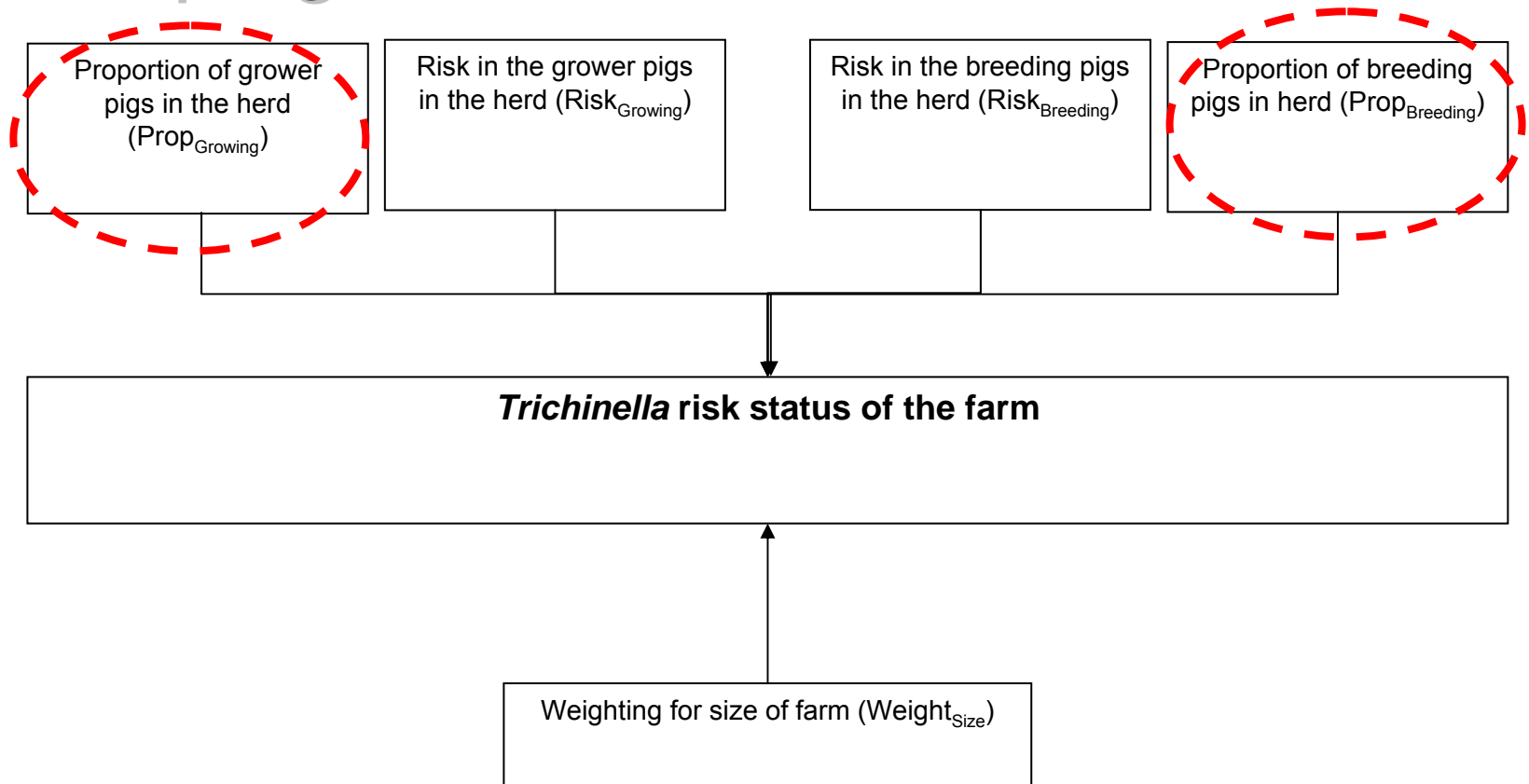


Figure 1: Conceptual overview of the process used to estimate the risk profile for an individual farm.

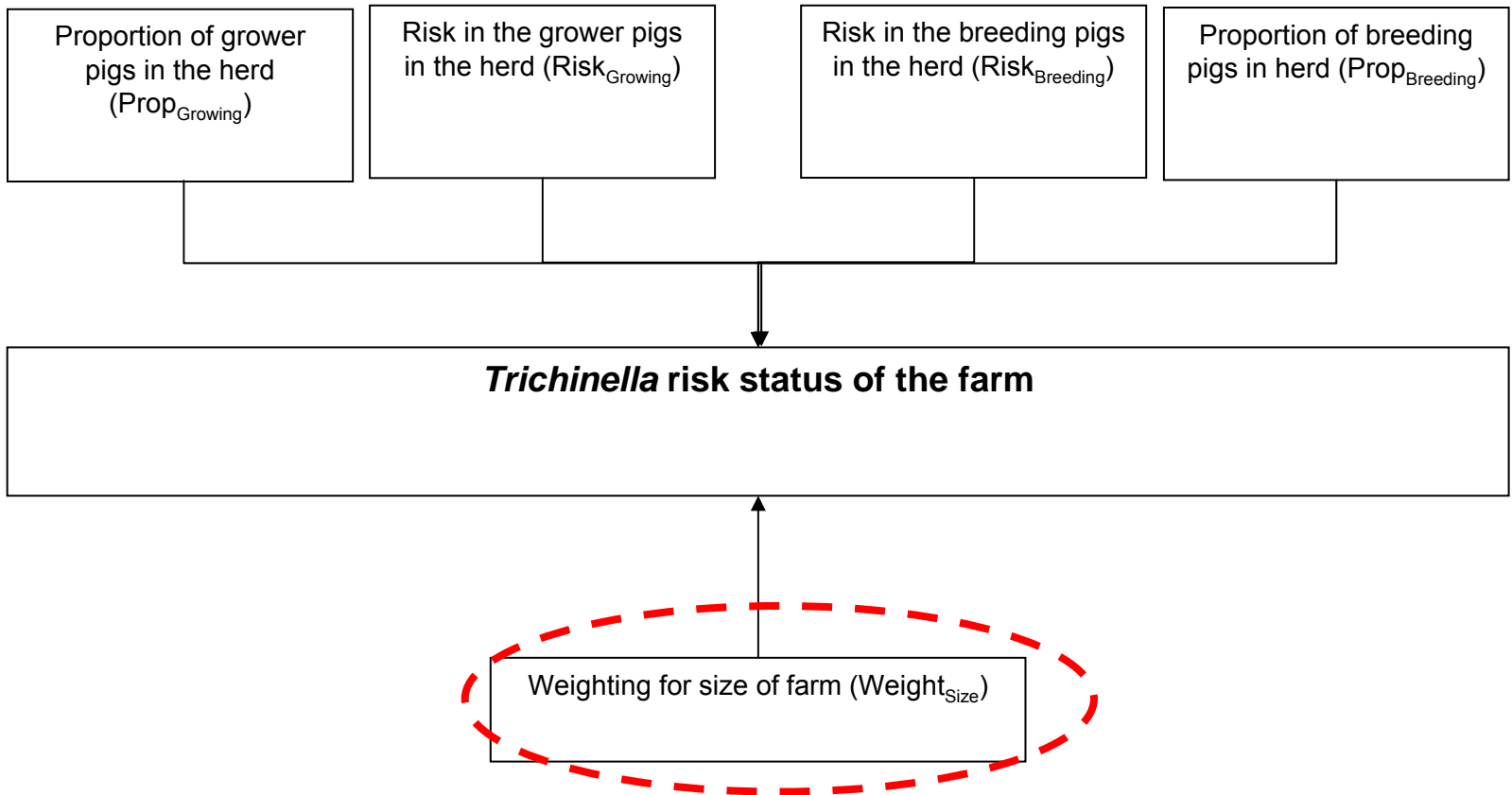
Proportion of growers ($\text{Prop}_{\text{Growing}}$)

- $\text{Prop}_{\text{Growing}}$ was included because risk status for an individual farm is a weighted average of the risk in the breeding and growing pigs
- Capturing data on the proportion of growing pigs would require detailed farm records.
- $\text{Prop}_{\text{Growing}}$ is closely related to the type of farm so we can make assumptions for different categories of farm

Proportion of breeding pigs

- The proportion of breeding animals in the herd is directly related to the proportion of growing pigs in the herd ($\text{Prop}_{\text{Growing}}$)
- Calculated by:
$$1 - \text{Prop}_{\text{Growing}}$$

Developing a farm risk status



Conceptual overview of the process used to estimate the risk profile for an individual farm.

Weighing for farm size

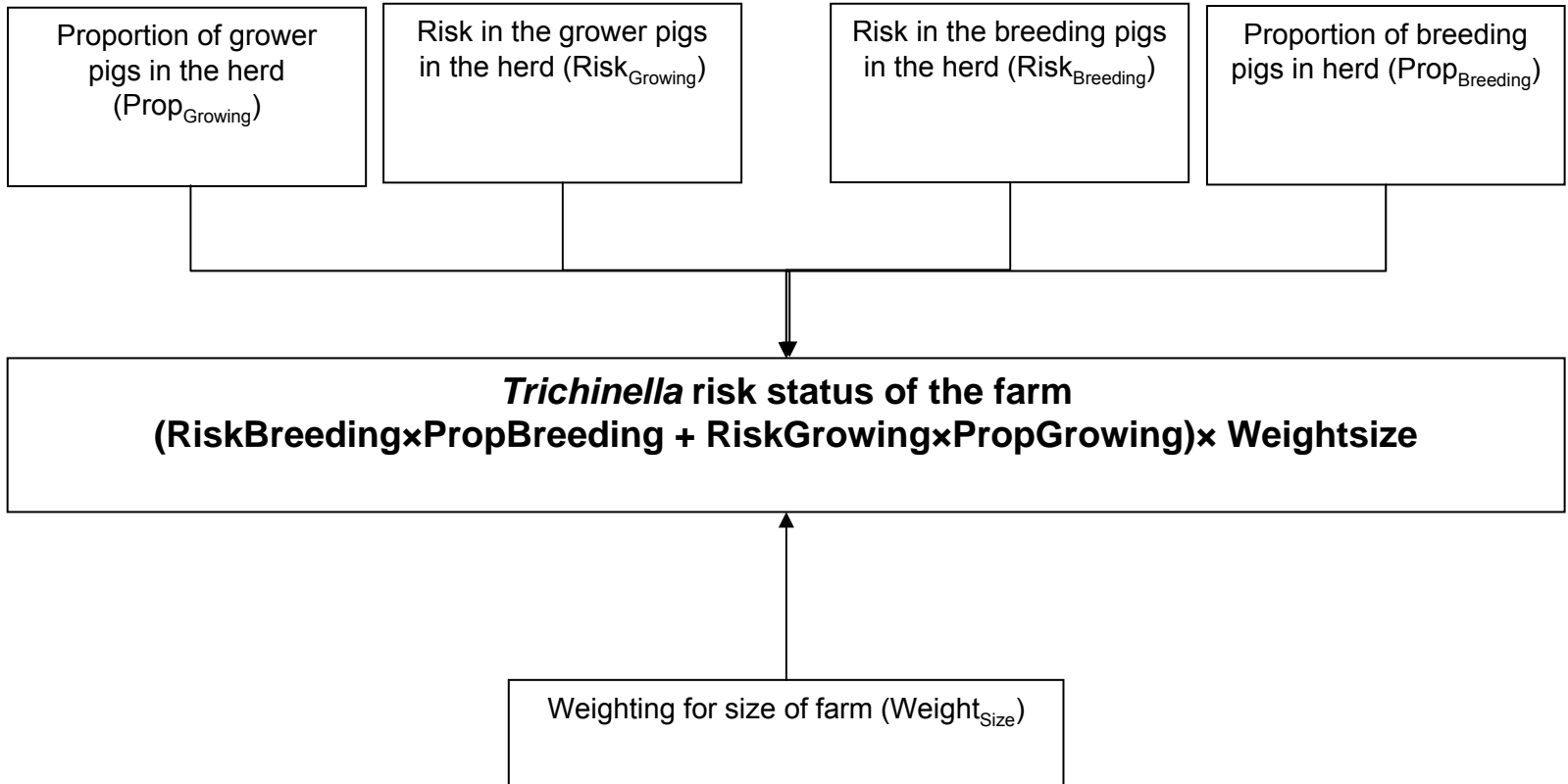
- The weighting for size was included because we believe that small farms are more likely to have pigs infected with *Trichinella*.
- The increased risk is supported by the literature.
- The reason for the increased risk is likely to be due to differences in management practices.

Weighing for farm size

Values for the weighting variable for farm size.

Category	Number of pigs	Weighting
Small	<100 sows and/or <500 growing pigs	10
Medium	100-299 sows and/or 500-999 growing pigs	2
Large	≥300 sows and/or ≥ 1,000 growing pigs	1

Developing a farm risk status

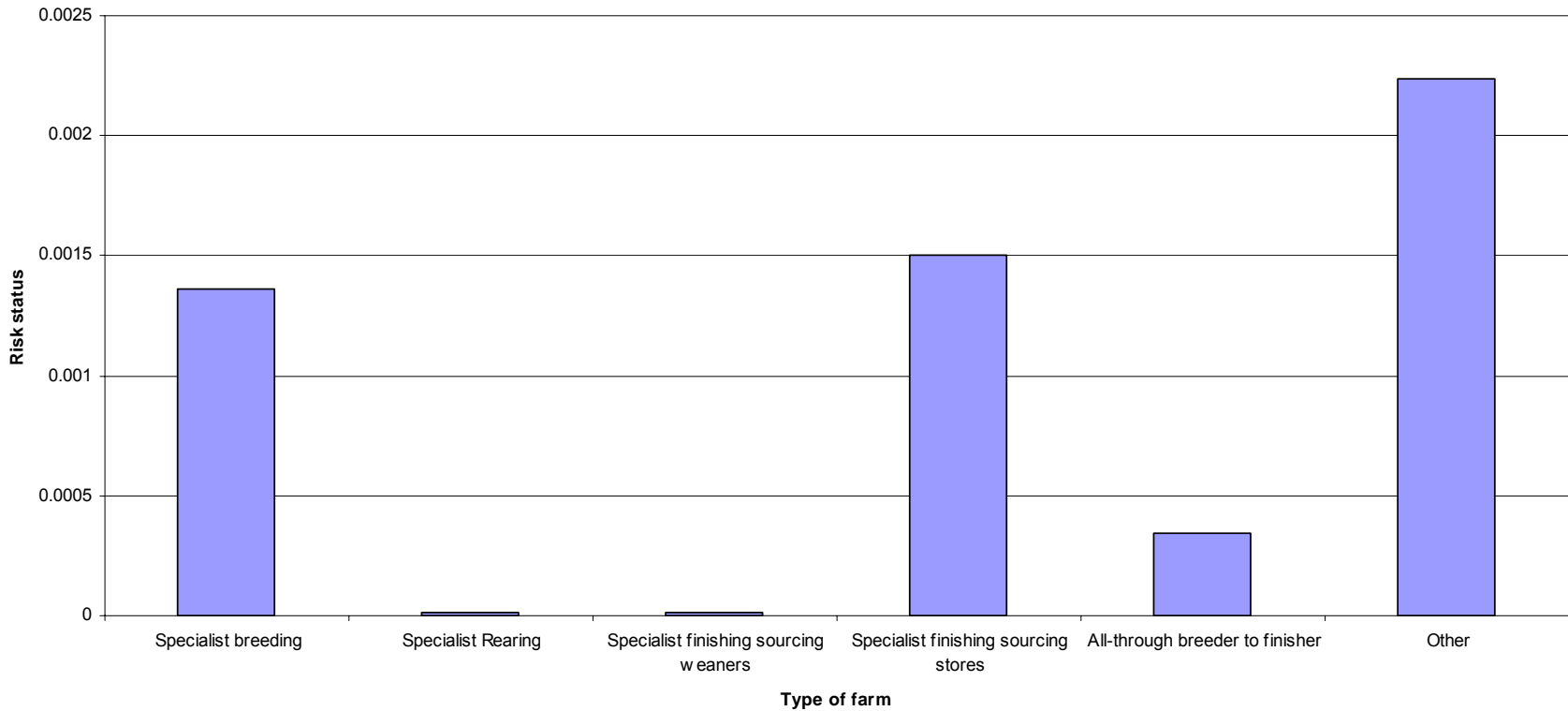


Conceptual overview of the process used to estimate the risk profile for an individual farm.

Interpreting the outcome

- The risk status for a farm is a number >0
- Greater departures from zero indicating that there is a greater likelihood that the farm has pigs infected with *Trichinella*.
- Risk status for a farm could be >1
- The risk status for a farm should not be interpreted as the probability that a pig on the farm is infected with *Trichinella*.

Example



Risk profile for different types farms with ≥ 300 sows and/or $\geq 1,000$ sows with growing and breeding pigs in high risk housing.

Further work

- Next step in this project will be:
 - Sensitivity testing of assumptions
 - This may result in changes to the method used to estimate risk
 - Determine values for farms in each of the 150 equi-pig areas
 - Farm risk profile will be used to design a new targeted surveillance system for *Trichinella* in GB.